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THE IDENTIFICATION OF GRASSES BY THEIR VEGETATIVE CHARACTERS.

By LYMAN CARRIER,
Agronomist in Pasture Investigations, Forage-Crop Investigations.

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INTRODUCTION.

It is often desirable to identify grasses by their vegetative characters. The usual botanical classifications based on the structure of the flowering parts are not useful for this purpose. Any mention of the leaves which may be included in botanical descriptions is usually for the purpose of confirming an identification. In lawns and pastures the best grasses are seldom allowed to reach the flowering stage, and some grasses change so materially in appearance as they reach maturity that it is difficult to see a resemblance to the young plants in those that have headed.

There have been previous attempts to work out keys for identifying young grasses, especially those of McAlpine,[1] of Ward,[2] and of Percival.[3] Stebler and Schröter[4] have described and illustrated fully the vegetative characters of the most common hay and pasture

[1] McAlpine, A. N. How to know grasses by the leaves. *In* Standard Cyclopedia of Modern Agriculture, v. 6, p. 153. 1890.

[2] Ward, H. M. Grasses. 190 p., illus. Cambridge, 1901.

[3] Percival, John. Agricultural botany. 798 p., illus. London, 1900.

[4] Stebler, F. G., and Schröter, Carl. The best forage plants. 3 v. in 1, illus., pl. London, 1889.

grasses. Lewton-Brain[1] has described the leaf anatomy of many British grasses.

The general plan of classification used in this bulletin follows somewhat that of Percival, but it is enlarged to include about three times the number of grasses described by him.

WHAT IS MEANT BY THE TERM "GRASS."

In this discussion the term "grass" is restricted entirely to those plants which botanists group in the family Gramineæ or Poaceæ and does not include the clovers and some other forage plants which are often classed agriculturally under the term "grass." The true grasses are recognizable by the following characters: Stems jointed, usually hollow; leaves in two ranks on opposite sides of the stem, each consisting of two parts, the **blade**, usually narrow and elongated, and the **sheath**, or basal portion, tubular and enwrapping the stem, its margins free or rarely grown together; leaf nerves parallel; at the junction of the sheath and blade a small membranous appendage, the **ligule**, which is sometimes wanting.

The plants which are most likely to be mistaken for grasses are the sedges (fig. 1), characterized by 3-ranked leaves on a solid, usually 3-angled stem, and the rushes (fig. 2), distinguished by solid stems, tubelike closed sheaths, and cylindrical or straplike leaves, neither folded nor rolled in the bud, and without ligules.

CHARACTERISTICS OF GRASSES BEFORE THE BLOOMING STAGE.

Grasses, like other flowering plants, may be considered as made up of roots, stems, leaves, and flowering parts. The natural classification of grasses is based mainly on the flowers and fruits, but the other organs show much variation in structure; indeed, sufficient to identify most grasses from their vegetative parts alone.

Roots.—The true roots of grasses are very slender and often much branched. They vary less than other organs, however, so that it is rarely possible to identify a grass from its roots alone, at least from the gross structure.

Stems.—Apart from the erect stems of grasses, which are usually flower bearing, many species have stems of a different sort. In some cases these are creeping, leaf bearing, and often rooting at the joints. Such stems are termed **stolons**. Many grasses have underground stems. These are jointed, bear scalelike reduced leaf sheaths, and are usually horizontal and coarser than roots. Such underground stems are termed **rootstocks** or **rhizomes**.

[1] Lewton-Brain, Lawrence. On the anatomy of the leaves of British grasses. *In* Trans. Linn. Soc., London, s. 2, Bot., v. 6, pt. 7, p. 315–359, pl. 36–40. 1904.

Leaves (fig. 3).—A grass leaf consists of two principal parts, the sheath or tubular basal portion which incloses the stem, and the **blade**, nearly always long, narrow, and most commonly flat. The sheaths are usually cylindrical in form, but in some grasses they are laterally compressed, forming a keel at the back, in which case they are described as compressed. In some grasses the nerves of the sheaths are prominent, in others scarcely noticeable. A few grasses have distinctively colored sheaths, the coloration being especially noticeable in the portion below ground. At the junction of the sheath and the blade are structures that are very useful in identifying grasses not in blossom. On the inside of the sheath is a small

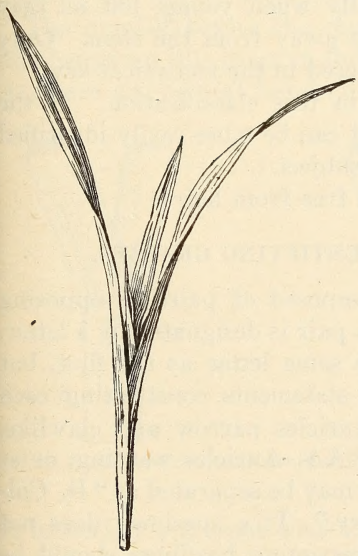

FIG. 1.—A common sedge.

FIG. 2.—A Juncus.

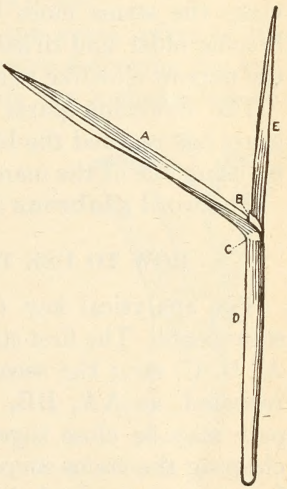

FIG. 3.—Different parts of a grass: *A*, Blade; *B*, ligule; *C*, collar; *D*, sheath; *E*, shoot or bud leaf.

organ, the **ligule**, apparently a continuation of the lining of the sheath and usually very thin in texture. It usually consists of a thin, semitransparent membrane, but sometimes it is a mere fringe of hairs, and only in rare cases is it wholly absent. The ligules of some grasses are wider than the sheaths and continuous with the hyaline margins. Owing to its wide variation in form, the ligule is one of the most dependable of characters for identification. Several special terms are necessary to describe these forms: **Entire**, when there are no notches or indentations along the margin; **lacerate**, when the margin is much cut; **truncate**, when the apex is apparently cut off squarely; **acute**, when the apex terminates in a sharp point; and **ciliate**, when the margin is fringed with hairs. Other terms, such as "toothed along the margins," or "hairy on the back," are self-explanatory.

The **collar** is a narrow band marking the place where the blade and the sheath join. It is often scarcely differentiated, but usually has a different color from either the blade or the sheath. In some cases the collar is a continuous band extending from one margin of the leaf to the other, but in others it is divided into two parts by the midnerve. The margins of the collar in some grasses are wavy, in others straight; some are hairy, others entirely glabrous or hairless. In some grasses one side of the collar is higher than the other, giving it a spiral appearance.

The **auricles** are earlike or clawlike appendages projecting from the collar or the angles at the top of the sheaths in a few grasses. They may be small or large, hairy or free from hairs. Often they clasp the stems more or less, especially when young, but as they become older and dried they may turn away from the stem. Only the narrow clawlike auricles are considered in the analytical key.

The flowering parts are not used in this classification. If the grass has reached the blooming stage it can be more easily identified by using one of the many books on the subject.

The word **glabrous** is used to mean free from hairs.

HOW TO USE THE KEY IN IDENTIFYING GRASSES.

The analytical key (pp. 6–9) is composed of pairs of opposing statements. The first statement of each pair is designated by a letter, A, B, C, etc.; the second one has the same letter as the first, but repeated, as AA, BB, CC, etc. The statements constituting each pair may be close together, as "A. Auricles narrow and clawlike, clasping the stems more or less," and "AA. Auricles wanting, or at least not narrow and clawlike," or they may be separated as "B. Collar hairy," and "BB. Collar not hairy." If a specimen does not agree with the first statement, all intervening headings should be passed over at once until the corresponding second statement which does apply is reached.

One of the best ways to learn to use this key is to get specimens of young grasses and endeavor to trace them. Take, for example, orchard grass. The first thing that must be done is to determine whether the leaf is folded (fig. 4, *A*) or rolled (**convolute**; fig. 4, *B* and *C*) in the bud. This is best done by cutting across the young shoot with a sharp knife and examining it with a lens. Another method of determining this point is to strip off the leaves carefully until the youngest is exposed and then examine with a lens. With the larger grasses it is easy to decide whether the leaves are folded or rolled in the bud, but with the finer sorts, such as the bent grasses or the fescues, it is sometimes difficult. The leaf in the case of orchard grass is folded in the bud, so it will come in Group I. The first line of the key, marked "A," reads "Auricles

narrow and clawlike, clasping the stem more or less." As orchard grass does not have clawlike auricles, pass on to the line "AA," which reads "Auricles wanting, or at least not narrow and clawlike." The next line after "AA," marked "B," reads "Collar hairy." Orchard grass does not have a hairy collar; so, pass over the intervening subjects to line "BB. Collar not hairy." The next line, "C. Sheaths below ground bright yellow," does not apply to this grass; so, pass on to "CC. Sheaths below ground not yellow." The next line, "D. Blades narrow and bristlelike, but with prominent veins on upper surface," does not apply; so, pass on to "DD. Blades flat; nerves not prominent." The next line, "E. Blades broad without white lines along midnerve by transmitted light; tip of blade taper pointed," applies, and here is also given the name of the grass.

The number before the common name of the grass refers to the number given this grass in the general description following the key. As there are several hundred grasses and this key includes but 56,

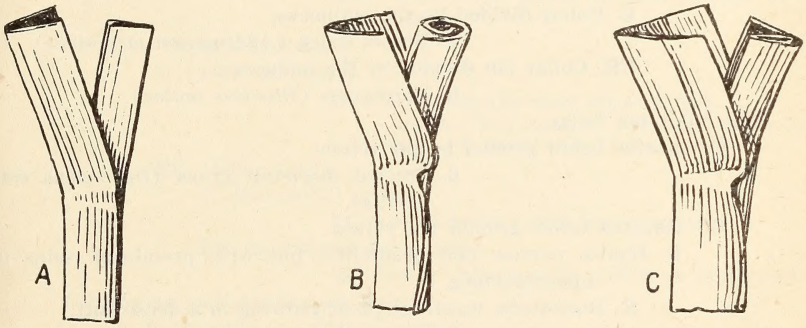

FIG. 4.—Different arrangements of leaves in the buds: *A*, Folded; *B* and *C*, rolled or convolute.

it is readily apparent that some grasses not mentioned here might be traced out in the key and be given wrong names. If a specimen answers all the requirements of the key as a certain grass but does not correspond with the detailed description, it is evidently not included in this bulletin.

While the characters which have been used are the ones that appear to be the most reliable, it is not uncommon to find individual specimens of every species which differ from the majority. For instance, tall oat-grass often has a few hairs on the sheaths. Timothy and a number of other grasses sometimes have pink or violet colored sheaths below ground when grown under certain conditions. It is very important to study several specimens of a species, if possible, before attempting to identify it.

No claim is made that this key is infallible. It has been of much assistance to the writer in identifying the common hay and pasture grasses, and it is hoped that it may serve the same purpose for others.

The small grains, while true grasses, have been placed in a separate group (p. 26), as there is more danger of confusing them with each other than with the other grasses. The grasses studied are all common to the eastern part of the United States, and no attempt has been made to include the distinctively western species.

ANALYTICAL KEY TO GRASS SEEDLINGS.

GROUP I.—Leaves folded in the bud; shoot apparently flattened.

A. Auricles narrow and clawlike, clasping the stems more or less.
1. Perennial rye-grass (*Lolium perenne*).

AA. Auricles wanting, or at least not narrow and clawlike.

B. Collar hairy.

C. Stolons present, creeping.
2. Carpet grass (*Axonopus compressus*).

CC. Stolons absent.

D. Leaves less than one-fourth inch wide.
3. Poverty grass (*Danthonia spicata*).

DD. Leaves one-fourth inch wide.

E. Collar divided by the midnerve.
4. Broom sedge (*Andropogon virginicus*).

EE. Collar not divided by the midnerve.
5. Yard-grass (*Eleusine indica*).

BB. Collar not hairy.

C. Sheaths below ground bright yellow.
6. Crested dog's-tail grass (*Cynosurus cristatus*).

CC. Sheaths below ground not yellow.

D. Blades narrow and bristlelike, but with prominent veins on upper surface.

E. Rootstocks wanting; plant growing in a dense tuft.
7. Sheep's fescue (*Festuca ovina*).

EE. Rootstocks present; plant creeping, forming an even turf.
8. Red fescue (*Festuca rubra*).

DD. Blades flat; nerves not prominent.

E. Blades broad without white lines along midnerve by transmitted light; tip of blade taper pointed.
9. Orchard grass (*Dactylis glomerata*).

EE. Blades narrow, with a white line on each side of the midnerve, the leaf being held up to the light and examined with a lens; tip of blade abrupt, boat shaped.

F. Rootstocks usually wanting.
10. Annual bluegrass (*Poa annua*).

FF. Rootstocks present.

G. Herbage pale bluish green.
11. Canada bluegrass (*Poa compressa*).

GG. Herbage dark green.

H. Ligule short, truncate; stems smooth.
12. Kentucky bluegrass (*Poa pratensis*).

HH. Ligule long, acute; sheaths rough.
13. Rough-stalked meadow grass (*Poa trivialis*).

GROUP II.—Leaves rolled in the bud; shoot apparently cylindrical.

A. Auricles narrow and clawlike.
  B. Sheaths reddish below ground; blades shining beneath.
    C. Leaf margins smooth.
      14. Italian rye-grass (*Lolium multiflorum*).
    CC. Leaf margins rough.
      15. Meadow fescue (*Festuca elatior*).
  BB. Sheaths not reddish.
    C. Rootstocks present.
      16. Quack-grass (*Agropyron repens*).
    CC. Rootstocks wanting.
      D. Hairs on sheaths pointing downward.
        17. Virginia wild rye (*Elymus virginicus*).
      DD. Hairs on sheaths pointing upward.
        18. Slender wild rye (*Elymus striatus*).
AA. Auricles wanting, or at least not clawlike.
  B. Sheaths not laterally compressed.
    C. Collar or sheath hairy.
      D. Sheaths not hairy.
        19. Sweet vernal grass (*Anthoxanthum odoratum*).
      DD. Sheaths hairy.
        E. Collar not hairy.
          20. Soft chess (*Bromus hordeaceus*).
            (NOTE.—Tall oat-grass sometimes has hairy sheaths; it would then be placed here.)
        EE. Collar hairy.
          F. Rootstocks present.
            21. Switch-grass (*Panicum virgatum*).
          FF. Rootstocks not present.
            22. Downy brome-grass (*Bromus tectorum*).
    CC. Collar and sheaths not hairy.
      D. Rootstocks or stolons present.
        E. Sheaths dark violet below ground.
          23. Meadow foxtail (*Alopecurus pratensis*).
        EE. Sheaths pale below ground.
          F. Rootstocks more than one-eighth inch in diameter.
            24. Reed canary grass (*Phalaris arundinacea*).
          FF. Rootstocks less than one-eighth inch in diameter.
            G. Leaves one-fourth inch wide.
              25. Redtop (*Agrostis alba*).
            GG. Leaves one-eighth inch wide.
              26. Creeping bent (*Agrostis stolonifera*).
      DD. Rootstocks and stolons not present.
        E. Sheaths white, with pink nerves.
          27. Chess (*Bromus secalinus*).
        EE. Sheaths without pink nerves.
          F. Margins of blades rough, retrorsely so near base.
            28. Timothy (*Phleum pratense*).
          FF. Margins of blades smooth.
            G. Stems without bulbs below ground.
              29. Tall oat-grass (*Arrhenatherum elatius*).
            GG. Stems with bulbs below ground.
              30. Bulbous oat-grass (*Arrhenatherum elatius bulbosum*).

BB. Sheaths laterally compressed.
C. Collar and sheath not hairy.
D. Rootstocks or stolons present.
E. Creeping stems (rootstocks) more than one-eighth inch in diameter.
31. Johnson grass (*Andropogon halepensis*).
EE. Creeping stems (stolons) less than one-eighth inch in diameter.
32. Nimble Will (*Muhlenbergia schreberi*).
DD. Rootstocks and stolons not present.
E. Ligule wanting.
33. Barnyard grass (*Echinochloa crus-galli*).
EE. Ligule present.
F. Ligule membranous.
34. Sudan grass (*Andropogon sorghum sudanensis*).
FF. Ligule a fringe of hairs.
G. Blades hairy above.
35. Yellow foxtail (*Chaetochloa lutescens*).
GG. Blades not hairy.
36. Spreading witch-grass (*Panicum dichotomiflorum*).
CC. Collar or sheath hairy (either or both).
D. Ligule membranous.
E. Sheaths white, with pink nerves.
F. Ligule entire, hairy on the back.
37. Rescue grass (*Bromus unioloides*).
FF. Ligule toothed on margin, not hairy on the back.
38. Velvet grass (*Holcus lanatus*).
EE. Sheaths pale, without pink nerves.
F. Stolons present.
G. Sheaths hairy.
39. Crab-grass (*Syntherisma sanguinalis*).
GG. Sheaths not hairy.
40. Small crab-grass (*Syntherisma ischaemum*).
FF. Stolons not present.
G. Habit of growth low and decumbent at the base.
41. Field paspalum (*Paspalum laeve*).
GG. Habit of growth upright.
42. Smooth paspalum (*Paspalum dilatatum*).
DD. Ligule a fringe of hairs.
E. Rootstocks present.
43. Bermuda grass (*Capriola dactylon*).
EE. Rootstocks not present.
F. Sheaths hairy.
G. Collar hairy on the back.
44. False redtop (*Tridens flavus*).
GG. Collar not hairy on the back.
45. Green foxtail (*Chaetochloa viridis*).

FF. Sheaths not hairy.
G. Collar hairy on the back.
46. Flat-stemmed panic (*Panicum anceps*).
GG. Collar not hairy on the back.
H. Leaves one-sixteenth inch wide.
47. Slender meadow grass (*Eragrostis pilosa*).
HH. Leaves one-eighth inch wide.
48. Stink-grass (*Eragrostis cilianensis*).

DETAILED DESCRIPTIONS OF FORTY-EIGHT SEEDLING GRASSES.

1. Perennial rye-grass (*Lolium perenne;* fig. 5).

A perennial, glabrous, dark-green, tufted grass; leaves folded in the bud; collar narrow, glabrous; auricles small, slender, clawlike; ligule membranous, short, obtuse, toothed near the tip; sheaths reddish below ground, smooth; blades flat, prominently nerved above, glossy and smooth beneath, long-linear, about one-eighth inch or more wide, sharp pointed.

This grass makes considerable winter growth in the Southern States and starts growth early in the spring. It closely resembles Italian rye-grass and meadow fescue when young, from which it is readily distinguished by its folded leaf bud.

FIG. 5.—Perennial rye-grass (*Lolium perenne*).[1]

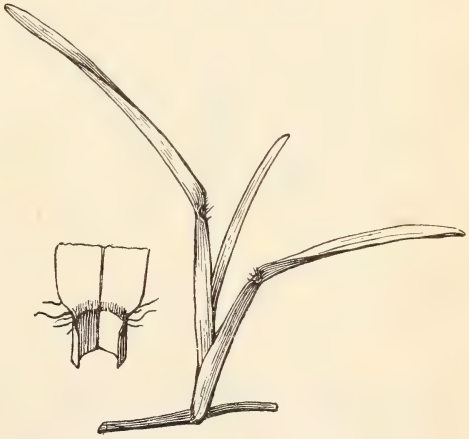

FIG. 6.—St. Augustine grass (*Stenotaphrum americanum*).

2. Carpet grass (*Axonopus compressus*).

A perennial grass with creeping stolons, forming a dense turf; leaves folded in the bud; collar narrow, indistinct, with a few hairs at margins; auricles none; ligule a fringe of short hairs; sheaths glabrous, diverging from stems; blades flat, usually short, linear, about one-eighth to one-

[1] Each figure shows a young plant and a detailed drawing of the leaf at the collar illustrating the ligule and other appendages.

fourth inch wide, round pointed; stolons compressed, about one-eighth inch in diameter.[1]

This grass is seldom found north of Tennessee or North Carolina, but it is common on the sandy soils of the Gulf States.

3. **Poverty grass** (*Danthonia spicata;* fig. 7).

A tufted perennial; leaves folded in the bud; collar narrow, continuous, hairy; auricles none; ligule a fringe of short hairs; blades often curled, glabrous, rough on the under surface and margins, about one-eighth inch wide, sharp pointed.

This grass is often found on poor sandy soils. The leaves, frequently curled, form a small rounded tuft.

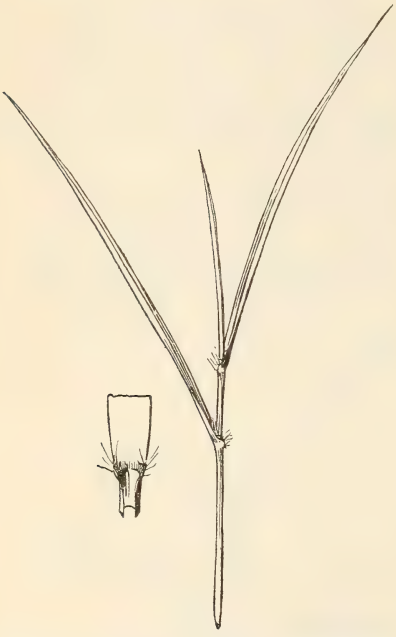

FIG. 7.—Poverty grass (*Danthonia spicata*).

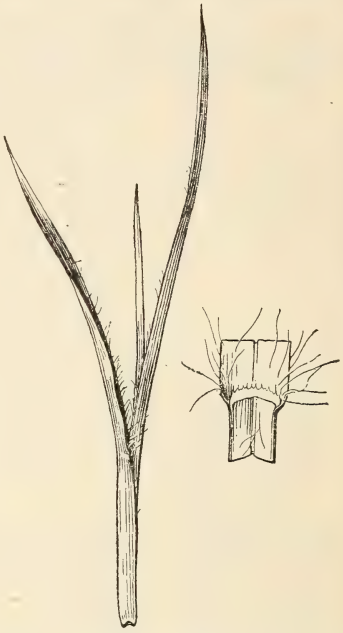

FIG. 8.—Broom sedge (*Andropogon virginicus*).

4. **Broom sedge** (*Andropogon virginicus;* fig. 8).

A coarse, tufted perennial; leaves folded in the bud; collar small, hairy, in two parts, separated in the middle by a broad gap; auricles none; ligule membranous, hairy on the back and fringed with long hairs; sheaths much compressed, hairy along the margins, merging indistinctly into the blade; blades compressed near base, hairy along margins, about one-fourth inch wide, sharp pointed.

The remains of the previous year's growth persist as tough, woody, buff-colored tufts. This grass is readily recognized by its peculiar collar, folded leaf bud, and strongly compressed sheaths and blades.

[1] St. Augustine grass (*Stenotaphrum americanum*) would also trace to this place. It very closely resembles carpet grass when young, but differs from it in the fact that the collar is very much constricted (fig. 6).

5. **Yard-grass** (*Eleusine indica;* fig. 9).

A tufted annual, decumbent at base; leaves folded in the bud; collar broad, continuous, hairy; auricles none; ligule membranous, medium long, coarsely toothed; sheaths white near the ground, green above. strongly compressed, sparsely hairy along the margins; blades V-shaped in cross section, about one-fourth inch wide, sparsely hairy above, tough in texture, linear, obtuse pointed.

This is a common summer grass, making conspicuous tufts in lawns.

6. **Crested dog's-tail grass** (*Cynosurus cristatus;* fig. 10).

A slender, erect, tufted perennial; leaves folded in the bud; collar broad, continuous, glabrous; auricles none; ligule membranous, medium long, truncate, toothed, continuous with the margins of the sheath; sheaths not compressed, glabrous, bright yellow below ground; blades glossy below, prominently nerved above, flat one-fourth inch wide, sharp pointed.

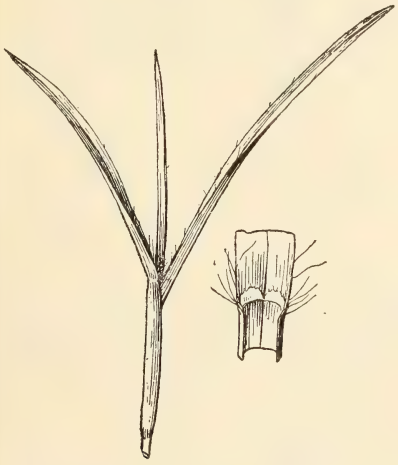

FIG. 9.—Yard-grass (*Eleusine indica*).

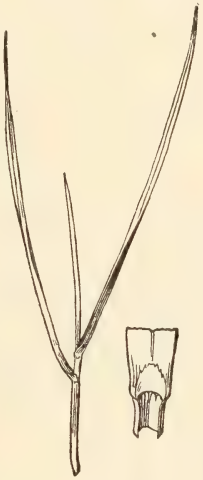

FIG. 10.—Crested dog's-tail (*Cynosurus cristatus*).

FIG. 11.—Sheep's fescue (*Festuca ovina*).

7. **Sheep's fescue** (*Festuca ovina;* fig. 11).

A densely tufted perennial; leaves folded in the bud; collar narrow, indistinct, glabrous; auricles short, obtuse; ligule membranous, very short; sheaths finely pubescent when viewed under a lens, not compressed, the old ones remaining as dark-brown fibers; blades long, linear, thick, bristle-like, about one-sixteenth inch wide, pale bluish green.

8. **Red fescue** (*Festuca rubra;* fig. 12).

A fine glabrous perennial grass with creeping rootstocks; leaves folded in the bud; collar narrow, indistinct, glabrous; auricles none; ligule membranous, short, entire, acute; sheaths minutely roughened, wider than blades, not compressed, the old ones remaining as brownish red fibers; blades long, linear, thick, bristlelike, one-sixteenth inch or less wide, dark green; rootstocks fine, branching, producing tufts of shoots.[1]

[1] In some forms of velvet bent (*Agrostis canina*) it is difficult to determine whether the leaf is folded or rolled in the bud. It may be distinguished from red fescue by its soft, flat blades, which are prominently nerved. The old leaf sheaths of velvet bent are grayish white in color instead of brown, as in red fescue.

This grass is distinguished from sheep's fescue by its finer leaves, more acute ligule, and habit of growth. Red fescue produces a fine even turf.

FIG. 12.—Red fescue (*Festuca rubra*).

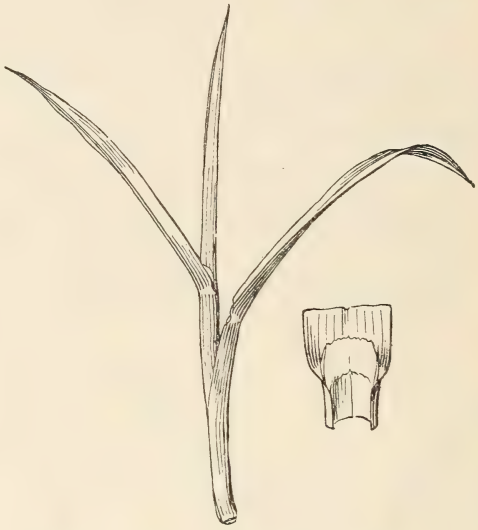

FIG. 13.—Orchard grass (*Dactylis glomerata*).

9. **Orchard grass** (*Dactylis glomerata;* fig. 13).

A tufted, glabrous perennial; leaves folded in the bud; collar broad, prominent, yellow; auricles wanting; ligule thin, membranous, very long, often lacerate; sheaths white below, green above, strongly compressed, the

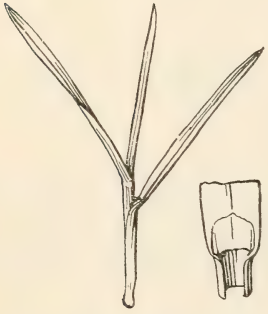

FIG. 14.—Annual bluegrass (*Poa annua*).

FIG. 15.—Canada bluegrass (*Poa compressa*).

edges united below into a closed tube; blades long, soft, V-shaped in cross section, usually one-fourth inch or more wide, sharp pointed, pale green in color.

This is a common meadow grass and is often found in pastures. It starts growth early in the spring.

10. **Annual bluegrass** (*Poa annua;* fig. 14).

A low-growing, glabrous, tufted annual; leaves folded in the bud; collar glabrous; auricles none; ligule medium long, acute, entire; sheaths compressed, glabrous; blades flat, short, linear, pale yellowish green, one-eighth inch wide.

This grass often heads out when but 1 inch high. Rootstocks are rare; when present, very short. In the South it makes considerable winter growth. Two white lines along the midnerve may be noticed by holding a blade up to the light and examining with a lens.

11. **Canada bluegrass** (*Poa compressa;* fig. 15).

A glabrous, bluish green perennial with creeping rootstocks forming a loose turf; leaves folded in the bud; collar light green; auricles none; ligule membranous, entire, acute, medium long; sheaths strongly compressed, often tinged with red; blades flat, long, linear, the apex like the bow of a boat, bluish green but with double light lines along the midnerve when viewed by transmitted light; rootstocks about one-sixteenth inch in diameter, each branch usually terminating in a single shoot.

This grass has more of a bluish color and grows in looser turf than Kentucky bluegrass, with which it is most likely to be confused.

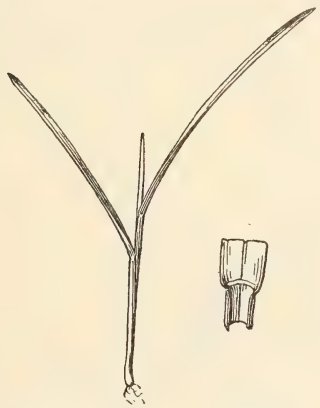

FIG. 16.—Kentucky bluegrass (*Poa pratensis*).

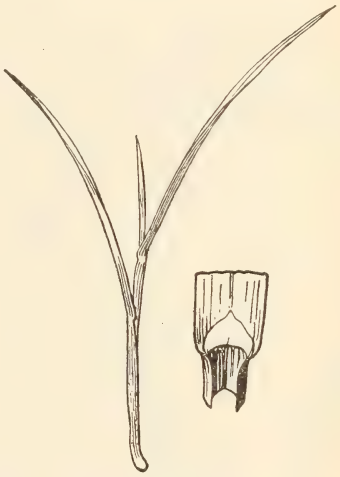

FIG. 17.—Rough-stalked meadow grass (*Poa trivialis*).

12. **Kentucky bluegrass** (*Poa pratensis;* fig. 16).

A dark-green perennial, creeping by rootstocks and forming a dense turf; leaves folded in the bud; collar narrow, glabrous; auricles none, ligule membranous, very short, truncate, entire; sheaths green, smooth, compressed; blade long, linear, less than one-eighth inch wide, the tip abrupt pointed like the bow of a boat, dark green, but with two light lines along the midnerve when viewed by transmitted light; rootstocks slender, branching, producing tufts with several shoots.

13. **Rough-stalked meadow grass** (*Poa trivialis;* fig. 17).

A dark-green, glabrous perennial, creeping by stolons; leaves folded in the bud; collar wide, glabrous; auricles none; ligule long, membranous, toothed at apex; sheaths compressed, closed, rough to the touch; blades

one-eighth inch wide, tapering to the tip; creeping stems always above ground, giving off clusters of shoots.

This grass is distinguished from Kentucky bluegrass by being coarser and rough, by the ligule, and by the above-ground stolons, the creeping stems of Kentucky bluegrass being always below ground.

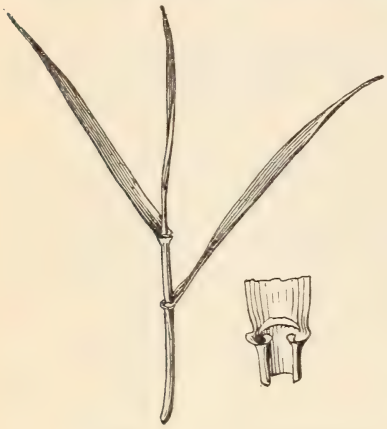

Fig. 18.—Italian rye-grass (*Lolium multiflorum*).

14. **Italian rye-grass** (*Lolium multiflorum;* fig. 18).

A tufted, glabrous annual, or sometimes perennial; leaves rolled in the bud; collar prominent; auricles narrow and clawlike; ligule membranous, short, thin, obtuse; sheaths not compressed, strongly nerved, violet pink below ground; blades three-sixteenths inch wide, taper pointed, smooth on the margins, prominently nerved on the upper surface, glossy beneath; nerves small, separated by light-green lines when viewed by transmitted light.

This grass is very similar to perennial rye-grass and meadow fescue. It is distinguished from meadow fescue by the smooth leaf margins and the nervation of the blades when held up to the light and viewed with a lens. It is distinguished from perennial rye-grass by its leaf bud, Italian rye-grass being convolute and perennial rye-grass folded.

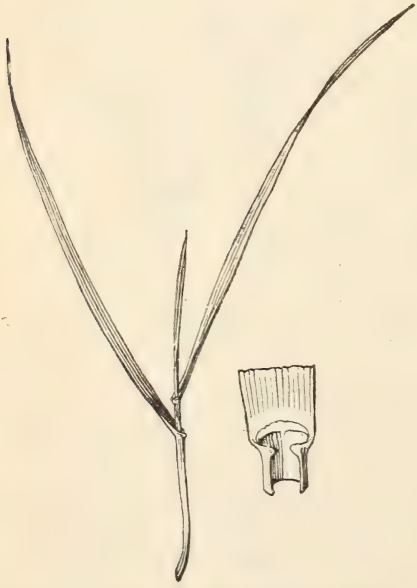

Fig. 19.—Meadow fescue (*Festuca elatior*).

Fig. 20.—Quack-grass (*Agropyron repens*).

15. **Meadow fescue** (*Festuca elatior;* fig. 19).

A tufted, glabrous, dark-green perennial; leaves rolled in the bud; collar broad, continuous; auricles none; ligule membranous, short, truncate;

sheaths not compressed, reddish pink below ground; blades flat, sharp pointed, rough on the margins, glossy beneath, nerved above, three-sixteenths inch wide; nerves separated into pairs by white lines when viewed by transmitted light.

This grass closely resembles both Italian rye-grass and perennial rye-grass. It may be distinguished from Italian rye-grass by its rough-margined blades (test with the tongue) and also by the nerves in the blades. Perennial rye-grass is distinguished by having its leaves folded in the bud.

16. **Quack-grass** (*Agropyron repens;* fig. 20).

A pale-green perennial, creeping by its long rootstocks; leaves rolled in the bud; collar broad, continuous, hairy; auricles slender, clawlike; ligule membranous, short, entire; sheaths hairy, not compressed; blades flat, finely hairy at the base, sharp pointed, one-fourth inch wide; nerves broad, not prominent; rootstocks strong, elongate, one-eighth inch or more in diameter.

This is a common, very aggressive grass. The hairs, while quite noticeable in the spring, are often invisible in the fall unless a lens is used.

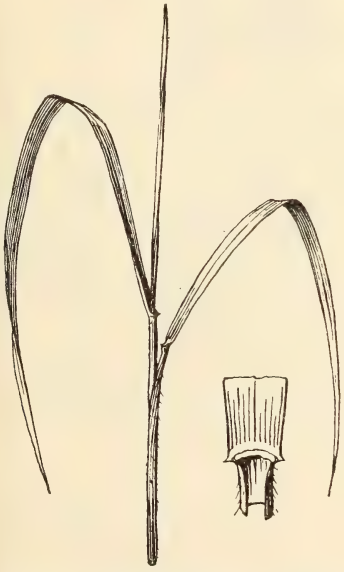

FIG. 21.—Virginia wild rye (*Elymus virginicus*).

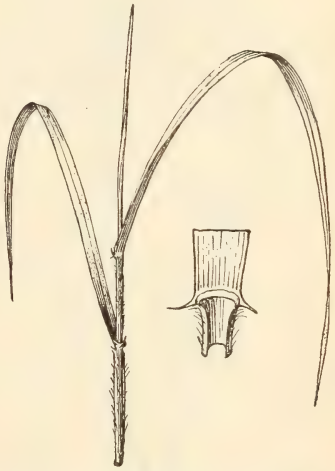

FIG. 22.—Slender wild rye (*Elymus striatus*).

17. **Virginia wild rye** (*Elymus virginicus;* fig. 21).

A loosely tufted perennial; leaves rolled in the bud; collar broad, glabrous, continuous; auricles short, clawlike; ligule membranous, very short, entire; sheaths not compressed, glabrous, fine veined, retrorsely hairy; blades flat, glabrous, dull above, glossy beneath, rough on the margins, one-fourth to one-half inch broad, sharp pointed; nerves small, indistinct.

This grass resembles the small grains in habit of growth.

18. **Slender wild rye** (*Elymus striatus;* fig. 22).

A loosely tufted perennial; leaves rolled in the bud; collar narrow, glabrous, continuous; auricles long, slender, clawlike, overlapping; ligule short, membranous, entire; sheaths not compressed, hairy, the hairs point-

ing upwards; blades flat, glossy beneath, dull and densely pubescent above and velvety to the touch, rough on the margins, one-fourth inch wide, sharp pointed.

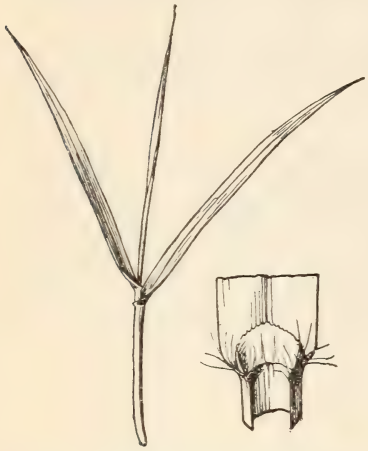

FIG. 23.—Sweet vernal grass (*Anthoxanthum odoratum*).

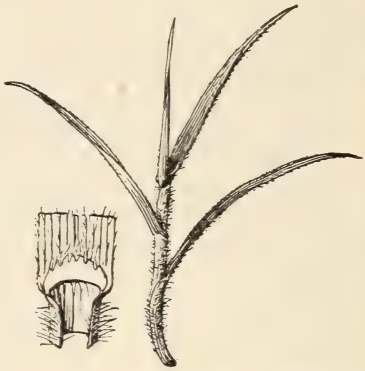

FIG. 24.—Soft chess (*Bromus hordeaceus*).

19. **Sweet vernal grass** (*Anthoxanthum odoratum;* fig. 23).

A low-growing tufted perennial; leaves rolled in the bud; collar broad, hairy; auricles none; ligule long, obtuse, membranous; sheaths glabrous, not compressed; blades flat, the margins rough and sometimes sparsely hairy near the base, one-fourth inch wide, sharp pointed.

This grass is easily recognized by its sweet odor, which becomes more pronounced in drying.

FIG. 25.—Switch-grass (*Panicum virgatum*).

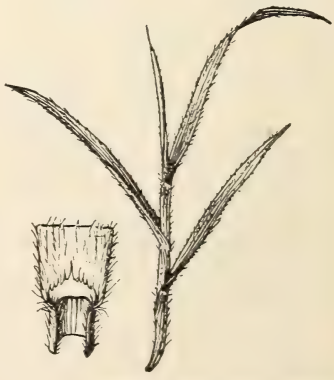

FIG. 26.—Downy brome-grass (*Bromus tectorum*).

20. **Soft chess** (*Bromus hordeaceus;* fig. 24).

A slender, tufted annual; leaves rolled in the bud; collar broad, with wavy margins, glabrous; auricles none; ligule membranous, medium long,

truncate, toothed, hairy on the back; sheaths with reddish pink veins, not compressed, densely hairy; blades flat, hairy, one-fourth inch wide, sharp pointed; nerves distinct, separated by dark-brown lines.

21. **Switch-grass** (*Panicum virgatum;* fig. 25).

A coarse perennial, creeping by rootstocks; leaves rolled in the bud; collar broad, continuous, hairy; auricles none; ligule a fringe of short hairs, in front of a tuft of fine, soft hairs at the base of the blade; sheaths not compressed, hairy along the margins near the top; blades flat, narrowed at base, one-fourth to one-half inch wide, taper pointed; rootstocks strong, one-eighth inch or more in diameter.

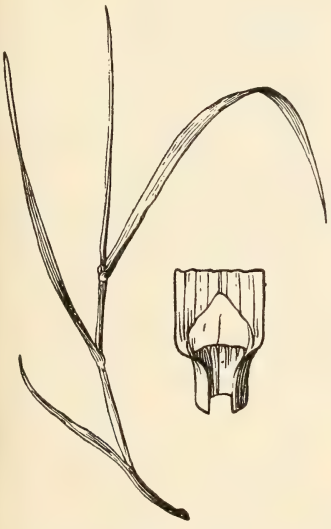

FIG. 27.—Meadow foxtail (*Alopecurus pratensis*).

FIG. 28.—Reed canary grass (*Phalaris arundinacea*).

22. **Downy brome-grass** (*Bromus tectorum;* fig. 26).

A slender, tufted annual; leaves rolled in the bud; collar narrow, continuous, hairy; auricles none; ligule medium long, acute, hairy on the margin near the apex; sheaths not compressed, hairy, veiny, the veins pinkish below ground; blades flat, weak, hairy, one-fourth inch wide, sharp pointed.

23. **Meadow foxtail** (*Alopecurus pratensis;* fig. 27).

A glabrous perennial with short rootstocks; leaves rolled in the bud; collar broad, glabrous; auricles none; ligule membranous, long, obtuse; sheaths smooth, not compressed, dark violet to maroon below ground; blades flat, one-fourth inch wide, rough on the upper surface and along the margins; rootstocks strong, branched, short, partly above ground, each terminating in a single shoot.

24. **Reed canary grass** (*Phalaris arundinacea;* fig. 28).

A coarse, glabrous perennial with stout rootstocks; leaves rolled in the bud; collar broad, spiral, with wavy margins; auricles none; ligule very long, obtuse, membranous, often torn, hairy on the back, wider than the sheaths; sheaths not compressed, hyaline on the margins; blades flat, rough on the margins, one-half inch or more wide, sharp pointed; rootstocks more than one-eighth inch in diameter.[1]

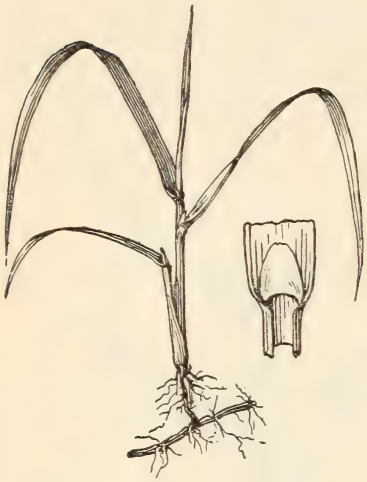

FIG. 29.—Redtop (*Agrostis alba*).

25. **Redtop** (*Agrostis alba;* fig. 29).

A dark-green, glabrous perennial, creeping by rootstocks; leaves rolled in the bud; collar narrow, divided into two parts by a space, glabrous; auricles none; ligule membranous, thin, very long, acute, finely toothed; sheaths smooth, not compressed; blades flat, distinctly nerved above, rough margined, one-fourth inch or more wide, sharp pointed; rootstocks about one-sixteenth inch in diameter.

Redtop, when young, resembles timothy, from which it is distinguished by its ligule, rootstocks, and coarsely nerved leaves.

26. **Creeping bent** (*Agrostis stolonifera;* fig. 30, *A*).

A fine-leafed glabrous perennial, creeping by rootstocks; leaves rolled in the bud; collar narrow; auricles none; ligule short, rather obtuse; sheaths smooth, not compressed; blades flat, distinctly nerved above, one-eighth inch or less wide, taper pointed; rootstocks very fine, branching, producing numerous tufts.

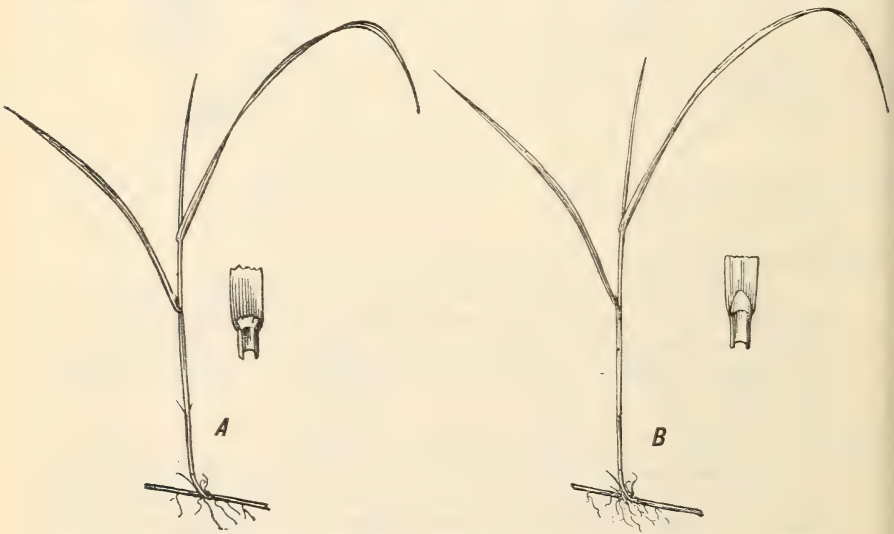

FIG. 30.—*A*, Creeping bent (*Agrostis stolonifera*); *B*, velvet bent (*Agrostis canina*).

[1] A variety of this grass called ribbon grass and grown for ornamental purposes is readily recognized by its green leaves striped with white.

This grass produces a fine, dense turf. Velvet bent (*Agrostis canina;* fig. 30, *B*) is similar to creeping bent, but grows in a still finer turf and is distinguished by a long acute ligule and by scabrous blades when viewed with a lens.

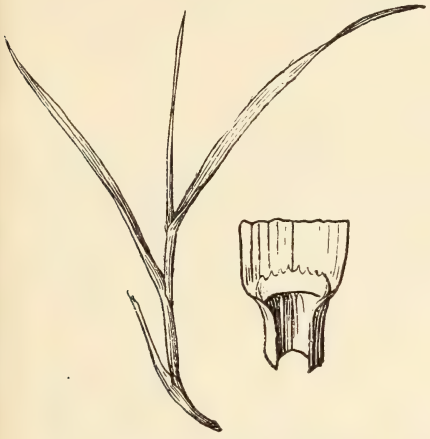

FIG. 31.—Chess (*Bromus secalinus*).

FIG. 32.—Timothy (*Phleum pratense*).

27. **Chess** (*Bromus secalinus;* fig. 31).

A tufted, pale-green annual; leaves rolled in the bud; collar broad, glabrous; auricles none; ligule short, membranous, toothed near the tip;

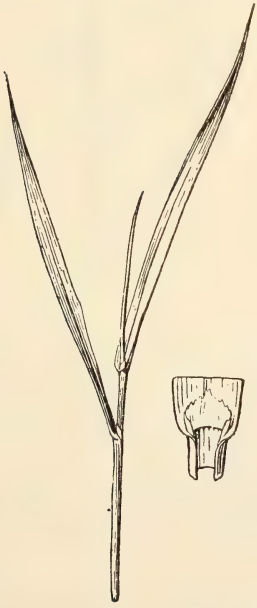

FIG. 33.—Tall oat-grass (*Arrhenatherum elatius*).

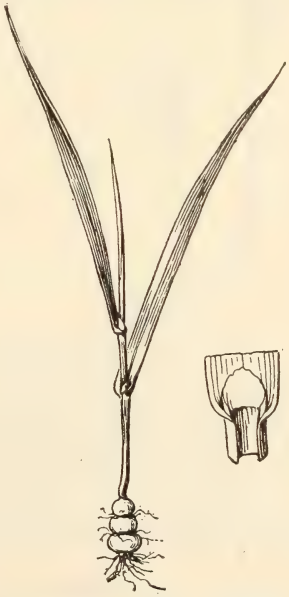

FIG. 34.—Bulbous oat-grass (*Arrhenatherum elatius bulbosum*).

sheaths not compressed, glabrous, rarely hairy, pink veined; blades flat, glabrous, or sometimes sparsely hairy above, one-fourth inch wide.

This grass is often found in fields of winter grain.

28. **Timothy** (*Phleum pratense;* fig. 32).

A stout, glabrous, tufted perennial; leaves rolled in the bud; collar broad, continuous; auricles none; ligule membranous, short, obtuse, the apex usually with several large teeth; sheaths not compressed; blades flat, indistinctly nerved, rough on the margins, one-fourth inch wide, sharp pointed.

The thickened base, or "corm," of the old stem usually may be found attached above the young plant below ground.

29. **Tall oat-grass** (*Arrhenatherum elatius;* fig. 33).

A loosely tufted perennial; leaves rolled in the bud; collar broad, divided into two parts by a space, glabrous; auricles none; ligule membranous, medium long, obtuse, finely toothed at apex, hairy on the back, sheaths not compressed, usually glabrous, sometimes sparsely hairy, prominently nerved; blades flat, linear, one-half inch or more wide, sharp pointed; nerves in pairs, not prominent, separated by white lines as seen by transmitted light.

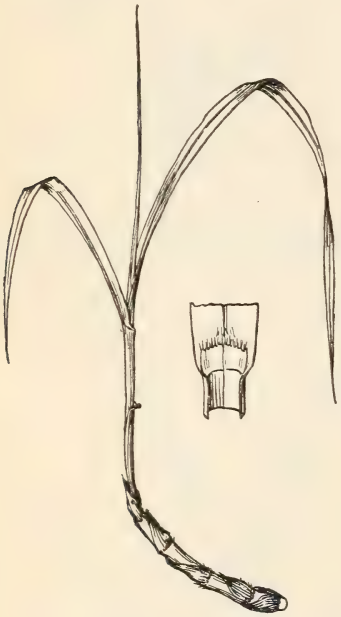

FIG. 35.—Johnson grass (*Andropogon halepensis*).

30. **Bulbous oat-grass** (*Arrhenatherum elatius bulbosum;* fig. 34).

A loosely tufted perennial; leaves rolled in the bud; collar broad, glabrous, divided into two parts by a gap; auricles none; ligule membranous, medium long, obtuse, finely toothed at apex, hairy on the back; sheaths not compressed, usually glabrous, sometimes sparsely hairy, prominently nerved; blades flat, linear, one-fourth inch or more wide, sharp pointed; nerves in pairs, separated by white lines when viewed by transmitted light.

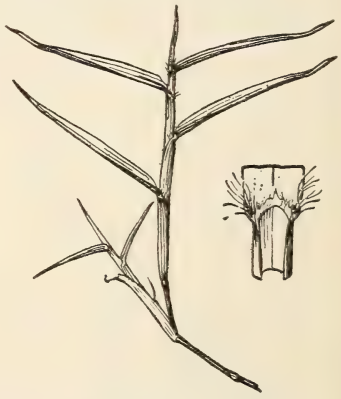

FIG. 36.—Nimble Will (*Muhlenbergia schreberi*).

There is a chain of from two to five bulbous growths at the base of the stems below ground which distinguishes this grass from tall oat-grass. Bulbous oat-grass has been recently introduced into this country and is occasionally found in eastern Virginia and North Carolina.

31. **Johnson grass** (*Andropogon halepensis;* fig. 35).

A nearly glabrous perennial, creeping by rootstocks; leaves rolled in the bud; collar broad; auricles none; ligule membranous, long, obtuse, lacerate ciliate at top; sheaths compressed, glabrous, usually pale, the outer ones sometimes reddish brown; blades flat, narrowed at base, and hairy at the very base, one-half inch or more wide, sharp pointed; midnerve white, very thick; rootstocks one-fourth inch or more in diameter.

32. **Nimble Will** (*Muhlenbergia schreberi;* fig. 36).

A pale-green, glabrous perennial, creeping by stolons; leaves rolled in the bud; collar narrow, glabrous; auricles none; ligule membranous, short, lacerate; sheaths compressed, loose; blades short when young, soft and flat; stolons very slender, hard, wiry, much branched, the joints one-half to 1 inch long.

Often the fine, very much branched stolons of this grass lie off the ground and take root only when the joints come in contact with the soil.

33. **Barnyard grass** (*Echinochloa crus-galli;* fig. 37).

A coarse, nearly glabrous, tufted annual; leaves rolled in the bud; collar broad, continuous, glabrous; auricles none; ligule wanting; sheaths compressed, the outer ones with pink nerves, the inner ones pale; blades flat, narrowed at base, the midnerve thick, sometimes sparsely hairy along the margins near the base, one-half inch or more wide, sharp pointed.

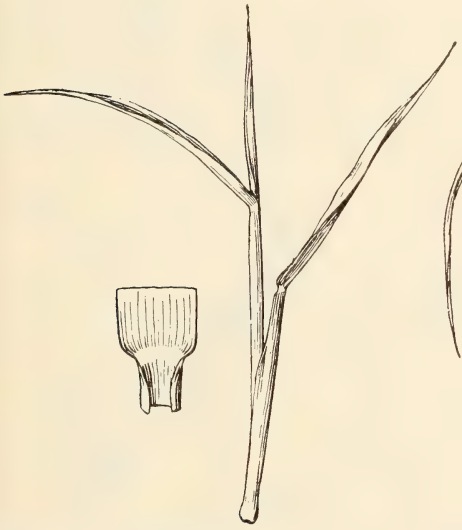

FIG. 37.—Barnyard grass (*Echinochloa crus-galli*).

FIG. 38.—Sudan grass (*Andropogon sorghum sudanensis*).

34. **Sudan grass** (*Andropogon sorghum sudanensis;* fig. 38).

A coarse, nearly glabrous annual; leaves rolled in the bud; collar broad, continuous, glabrous; auricles none; ligule membranous, long, lacerate, wider than the sheaths; sheaths slightly compressed, hyaline margined; blades flat, narrowed at base, pale green above, one-half inch or more wide, sharp pointed; midnerve thick, pale green.

This grass is similar to Johnson grass, but it does not have rootstocks. The midnerve is also distinctive.

35. **Yellow foxtail** (*Chaetochloa lutescens;* fig. 39).

A coarse, tufted annual; leaves rolled in the bud; collar narrow, yellow, continuous, glabrous; auricles none; ligule a fringe of short hairs; sheaths compressed, glabrous; blades flat near the base, hairy on the upper surface, one-fourth inch or more wide, sharp pointed.

36. **Spreading witch-grass** (*Panicum dichotomiflorum;* fig. 40).

A coarse, tufted, glabrous annual; leaves rolled in the bud; collar broad, continuous, glabrous; auricles none; ligule a fringe of hairs; sheaths slightly compressed, glabrous; blades flat, glossy beneath, dull above, one-half inch wide, sharp pointed; midnerve light green, slightly rough.

37. **Rescue grass** (*Bromus unioloides;* fig. 41).

A coarse, tufted grass, annual or sometimes perennial; leaves rolled in the bud; collar broad, continuous, hairy; auricles none; ligule long, membranous, entire, hairy on the back; sheaths strongly compressed, hairy, the older ones with pink nerves; blades flat, sparsely hairy, one-half inch wide.

This grass makes considerable winter growth in the Southern States.

FIG. 39.—Yellow foxtail (*Chaetochloa lutescens*).

38. **Velvet grass** (*Holcus lanatus;* fig. 42).

A pale, tufted, hairy perennial; leaves rolled in the bud; collar continuous, hairy; auricles none; ligule short, membranous, coarsely toothed at apex, hairy on the back; sheaths compressed, pink nerved, densely hairy; blades flat, soft, hairy, one-half inch wide, sharp pointed.

FIG. 40.—Spreading witch-grass (*Panicum dichotomiflorum.*)

39. **Crab-grass** (*Syntherisma sanguinalis;* fig. 43).

A pale-green annual, creeping by stolons; leaves rolled in the bud; collar broad, prominent, sparsely hairy; auricles none; ligule membranous, long, acute, toothed; sheaths compressed, hairy; blades flat, sparsely hairy, wavy margined, one-fourth inch wide, sharp pointed; stolons about one-sixteenth inch in diameter, much branched.

40. **Small crab-grass** (*Syntherisma ischaemum;* fig. 44).

A low-growing annual, creeping by stolons; leaves rolled in the bud; collar broad, sparsely hairy; auricles none; ligule membranous, long, entire; sheaths compressed, glabrous; blades flat, sparsely hairy at base, otherwise glabrous, one-fourth inch wide, sharp pointed; stolons about one-sixteenth inch in diameter, branched.

41. **Field paspalum** (*Paspalum laeve;* fig. 45).

A coarse, tufted perennial; leaves rolled in the bud (fig. 4, *C*); collar hairy, broad, continuous; auricles none; ligule membranous, thin, acute,

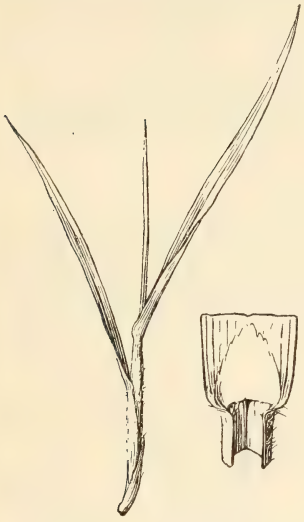

FIG. 41.—Rescue grass (*Bromus unioloides*).

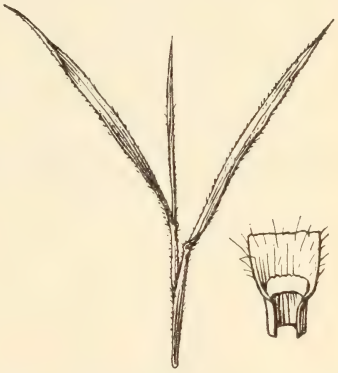

FIG. 42.—Velvet grass (*Holcus lanatus*).

long; sheaths strongly compressed, sparsely hairy on the margins and midnerve; blades flat, hairy above, near the base, and along the margins, one-fourth inch wide, sharp pointed, tinged with reddish brown near tips.

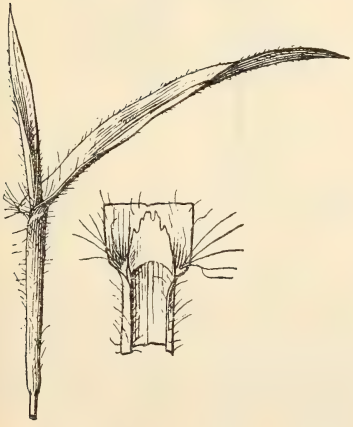

FIG. 43.—Crab-grass (*Syntherisma sanguinalis*).

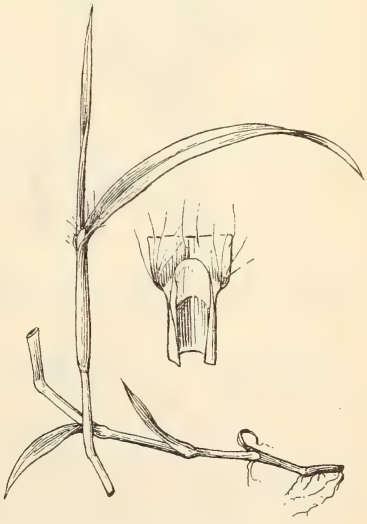

FIG. 44.—Small crab-grass (*Syntherisma ischaemum*).

This grass very closely resembles smooth paspalum, false redtop, and flat-stemmed panic when young. The blades are usually creased lengthwise from the manner in which they are rolled in the bud. It starts growth in late spring.

42. **Smooth paspalum** (*Paspalum dilatatum;* fig. 46).

A coarse, tufted perennial; leaves rolled in the bud; collar medium broad, continuous, hairy; auricles none; ligule membranous, thin, acute, long; sheaths strongly compressed, densely hairy below, sparsely so above; blades sparsely hairy at base, one-fourth inch wide, sharp pointed, thin, narrowed at base.

Smooth paspalum is a taller growing grass than field paspalum, which it closely resembles. The densely hairy sheaths and usually darker green color are characteristic. It is often grown in the Southern States for hay. The membranous ligule distinguishes this grass from false redtop and flat-stemmed panic.

43. **Bermuda grass** (*Capriola dactylon;* fig. 47).

A low-growing perennial, creeping by rootstocks or stolons, or both; leaves rolled in the bud; collar narrow, with a ring of stiff hairs; auricles none; ligule a fringe of short hairs; sheaths strongly compressed, sparsely hairy; blades soft, rough margined, one-eighth inch wide, sharp pointed; rootstocks one-eighth inch in diameter, mostly below ground, but becoming stolons on hard soil.

FIG. 45.—Field paspalum (*Paspalum laeve*).

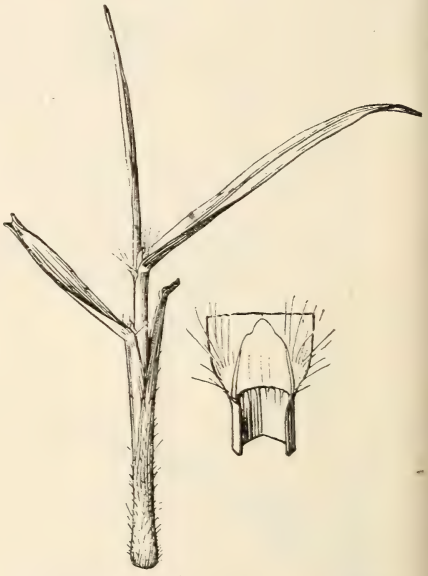

FIG. 46.—Smooth paspalum (*Paspalum dilatatum*).

44. **False redtop** (*Tridens flavus;* fig. 48).

A coarse, tufted perennial; leaves rolled in the bud (fig. 4, *C*); collar hairy on the back; auricles none; ligule a fringe of short hairs; sheaths strongly compressed, tough, firm, smooth, glossy, slightly hairy on the upper margins; blades narrowed at base, taper pointed, minutely hairy above, smooth and glossy beneath, one-half inch wide, sharp pointed.

This grass closely resembles the field and the smooth paspalums, from which it is distinguished by its ligule, and flat-stemmed panic, from which it differs in not having rootstocks. The leaves are creased lengthwise from the manner in which they are rolled in the bud.

45. **Green foxtail** (*Chaetochloa viridis;* fig. 49).

A coarse, tufted annual; leaves rolled in the bud; collar narrow, hairy; auricles none; ligule a fringe of hairs, longest near the margins; sheaths slightly compressed above, hairy along the margins; blades soft, flat, narrowed at base, one-fourth to one-half inch wide, sharp pointed.

46. **Flat-stemmed panic** (*Panicum anceps;* fig. 50).

A coarse perennial with short rootstocks; leaves rolled in the bud (fig. 4, *C*); collar hairy on back and margins; auricles none; ligule a fringe

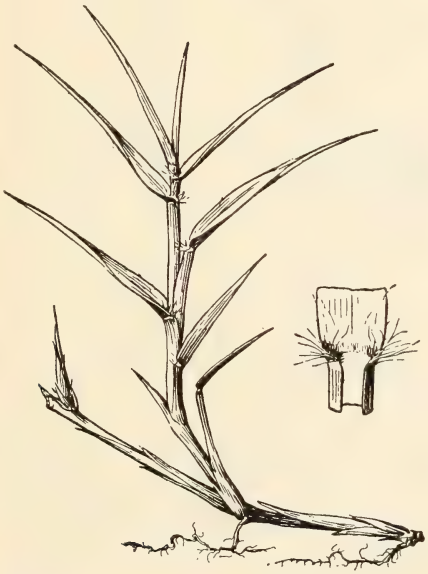

FIG. 47.—Bermuda grass (*Capriola dactylon*).

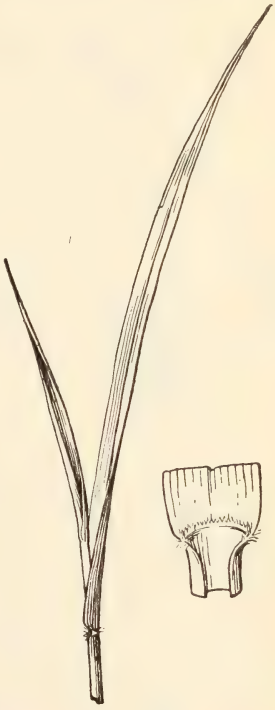

FIG. 48.—False redtop (*Tridens flavus*).

of short hairs; sheaths strongly compressed, glossy, usually glabrous; blades sparsely hairy on upper surface near base, three-eighths to one-half inch wide, sharp pointed.

This grass closely resembles the field and smooth paspalums, from which it is distinguished by its hairy ligule and rootstocks, and also false redtop, from which it differs in the presence of rootstocks.

47. **Slender meadow grass** (*Eragrostis pilosa;* fig. 51).

A slender, tufted annual; leaves rolled in the bud; collar narrow, hairy; auricles none; ligule a fringe of hairs; sheaths slightly compressed, glabrous; blades dull and sparsely hairy above, glossy below, less than one-eighth inch wide, sharp pointed.

It closely resembles stink-grass, but it is not so large.

48. **Stink-grass** (*Eragrostis cilianensis;* fig. 52).

A slender, tufted, often decumbent annual; leaves rolled in the bud; collar narrow, hairy; auricles none; ligule a fringe of hairs; sheaths glabrous,

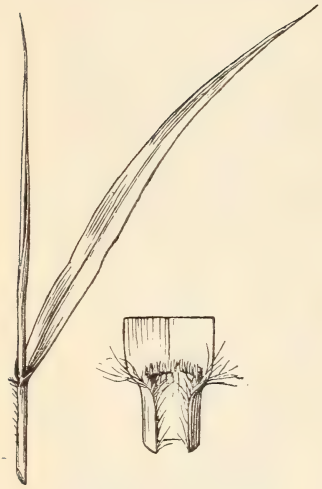

FIG. 49.—Green foxtail (*Chaetochloa viridis.*)

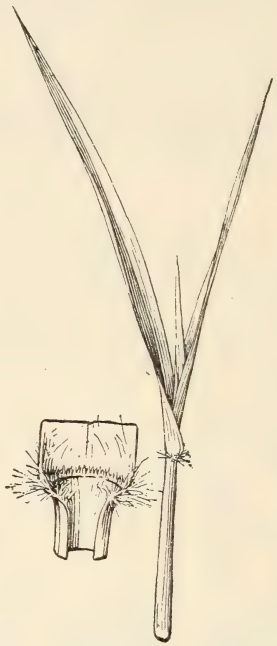

Fig. 50. — Flat-stemmed panic (*Panicum anceps*).

FIG. 51.—Slender meadow grass (*Eragrostis pilosa*).

slightly compressed; blades flat, dull, and sparsely hairy above, glossy beneath, one-eighth inch wide.

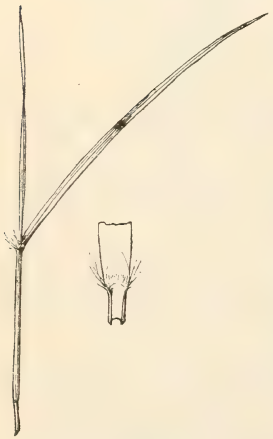

FIG. 52.—Stink-grass (*Eragrostis cilianensis*).

Stink-grass is very similar to slender meadow grass except that the plants of stink-grass are about twice as large as those of slender meadow grass. In most botanical works this grass is called *Eragrostis major.*

IDENTIFICATION OF SMALL-GRAIN SEEDLINGS.

The seedlings of small grains are, under all conditions, very difficult to identify. Men who are constantly growing these grains usually learn to distinguish the different species. Even certain varieties in a species are sometimes recognizable. But there is great variation even in the different varieties, and the varietal differences in each species make it difficult to find a combination of characters that will always hold true for the species.

All of the small grains so far as studied have their leaves rolled in the bud. The most dependable characters are found in the collar,

the presence or absence of claws, the pubescence and the general shape of the blades, especially at the tips. The ligules of all are very similar, the principal differences being in shape and length.

ANALYTICAL KEY TO SMALL-GRAIN SEEDLINGS.

A. Collar without clawlike appendages.
49. Oats (*Avena sativa*).
AA. Collar with clawlike appendages which clasp the stem more or less.
B. Claws hairy.
C. Sheaths and blades finely pubescent, soft, and velvety.
50. Emmer (*Triticum dicoccum*).
CC. Sheaths and blades not pubescent.
D. Collar and claws large.
51. Spelt (*Triticum spelta*).
DD. Collar and claws slender.
52. Wheat (*Triticum aestivum*).
BB. Claws not hairy.
C. Collar and claws large and prominent.
D. Nerves of blades not prominent, upper surface rough.
53. Barley (*Hordeum sativum*).
DD. Nerves of blades broad and prominent, smooth on upper surface.
54. Polish wheat (*Triticum polonicum*).
CC. Collar and claws slender.
D. Blades and sheaths sparsely hairy.
55. Rye (*Secale cereale*).
DD. Blades and sheaths free from hairs.
56. Durum wheat (*Triticum durum*).

DETAILED DESCRIPTIONS OF EIGHT SMALL-GRAIN SEEDLINGS.

49. **Oats** (*Avena sativa;* fig. 53).

Collar broad, separated into two parts by midnerve, free from claws, finely hairy; ligule membranous, long, acute, toothed; sheaths sparsely hairy; blades hairy along margins, flat, rough, one-half inch wide.

The blades are longer and more taperingly pointed than those of wheat. Some varieties of spring oats are free from hairs on sheaths and blades. Spring oats have a more upright habit of growth than the winter varieties.

50. **Emmer** (*Triticum dicoccum;* fig. 54).

Collar medium broad, with claws; collar and claws sparsely hairy; ligule thin, membranous, acute, toothed; sheaths finely pubescent, soft and velvety, the hairs seen only with a lens, one-fourth inch wide, sharp pointed; blades prominently nerved.

51. **Spelt** (*Triticum spelta;* fig. 55).

Collar broad, similar to that of barley, with large, hairy claws; ligule membranous, medium long, toothed, acute; sheaths free from hairs; blades free from hairs near base except a few at margins, one-fourth inch or more wide, sharp pointed on older, abrupt on younger plants; nerves small.

52. **Wheat** (*Triticum aestivum;* fig. 56).

Collar broad, not spiral, continuous, with small, slender claws, hairy along margins and claws; ligule long, truncate, toothed; sheaths not keeled, free from hairs; blades long, free from hairs, smooth, flat, the older ones abrupt pointed, one-half inch wide.

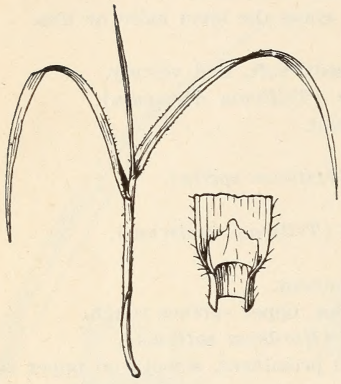

FIG. 53.—Oats (*Avena sativa*).

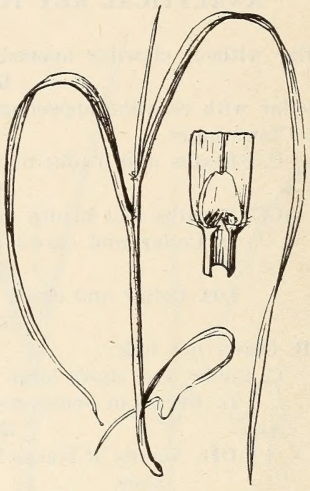

FIG. 54.—Emmer (*Triticum dicoccum*).

53. **Barley** (*Hordeum sativum;* fig. 57).

Collar broad, prominent, yellow, sometimes red, one side higher than the other, with large claws clasping the young shoot spirally; ligule membranous, medium long, acute, entire; sheaths sparsely hairy; blades broad at base, shorter than those of wheat, rough on upper surface, one-half inch wide, sharp pointed; nerves not prominent, covered with white specks when viewed under a lens.

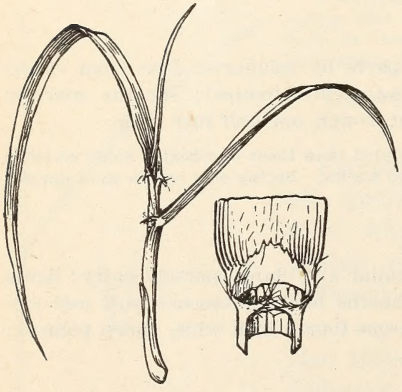

FIG. 55.—Spelt (*Triticum spelta*).

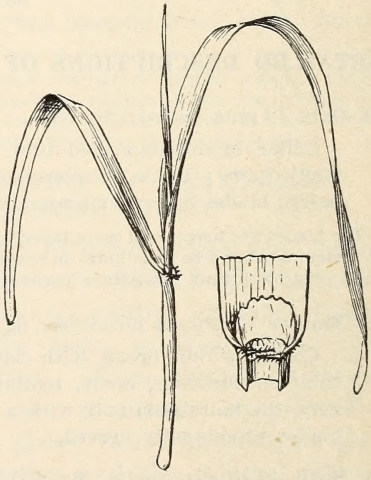

FIG. 56.—Wheat (*Triticum sativum*).

54. **Polish wheat** (*Triticum polonicum;* fig. 58).

Collar broad, spiral, with claws, hairy on margins and claws; ligule long, acute, notched on top; sheaths not hairy; blades one-half inch wide, long, sharp pointed; nerves broad and prominent on upper surface.

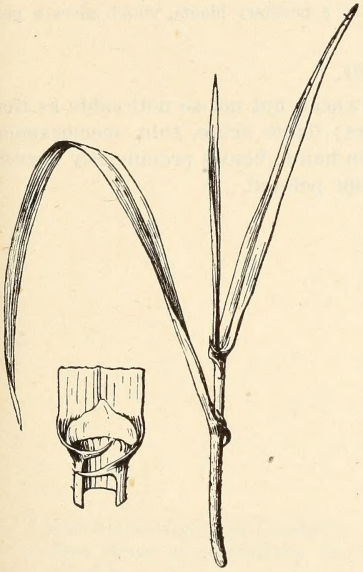

FIG. 57.—Barley (*Hordeum sativum*).

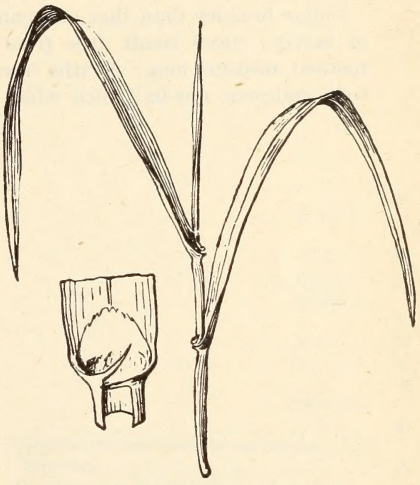

FIG. 58.—Polish wheat (*Triticum polonicum*).

It is difficult to find characters which will distinguish this grain from barley, although there is considerable difference in the appearance of the two when growing. The claws

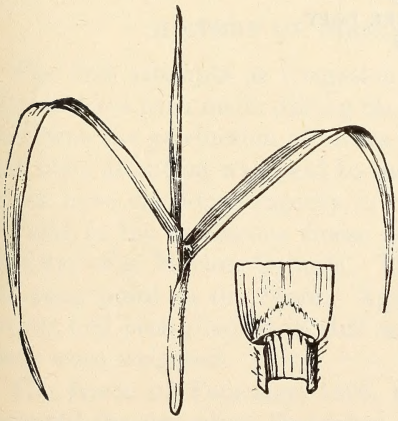

FIG. 59.—Rye (*Secale cereale*).

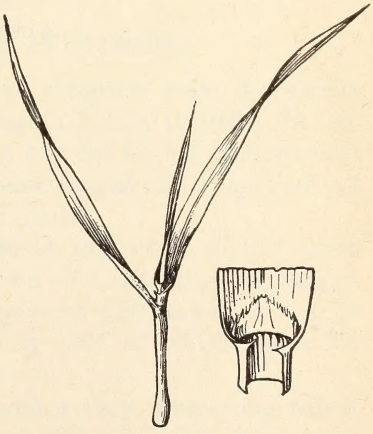

FIG. 60.—Durum wheat (*Triticum durum*).

of Polish wheat are more slender than those of barley and may have rudimentary hairs when viewed with a lens, while barley has none. The collar of Polish wheat is not so broad and prominent as that of barley.

55. **Rye** (*Secale cereale;* fig. 59).

Collar broad, not spiral, continuous, with fine, sharp claws barely overlapping; ligule short, truncate, lacerate; sheaths sometimes hairy; blades toothed on margins, hairy at base on upper side, sparsely hairy elsewhere, one-half inch wide, abrupt pointed.

The sheaths and blades are usually covered with a powdery bloom, which gives a pale bluish cast to this plant.

56. **Durum wheat** (*Triticum durum;* fig. 60).

Collar broader than that of common wheat, but not so noticeable as that of barley; claws small, free from hairs; ligule acute, thin, membranous, toothed, medium long; sheaths free from hairs; blades prominently nerved, soft, glabrous, one-half inch wide, abrupt pointed.

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